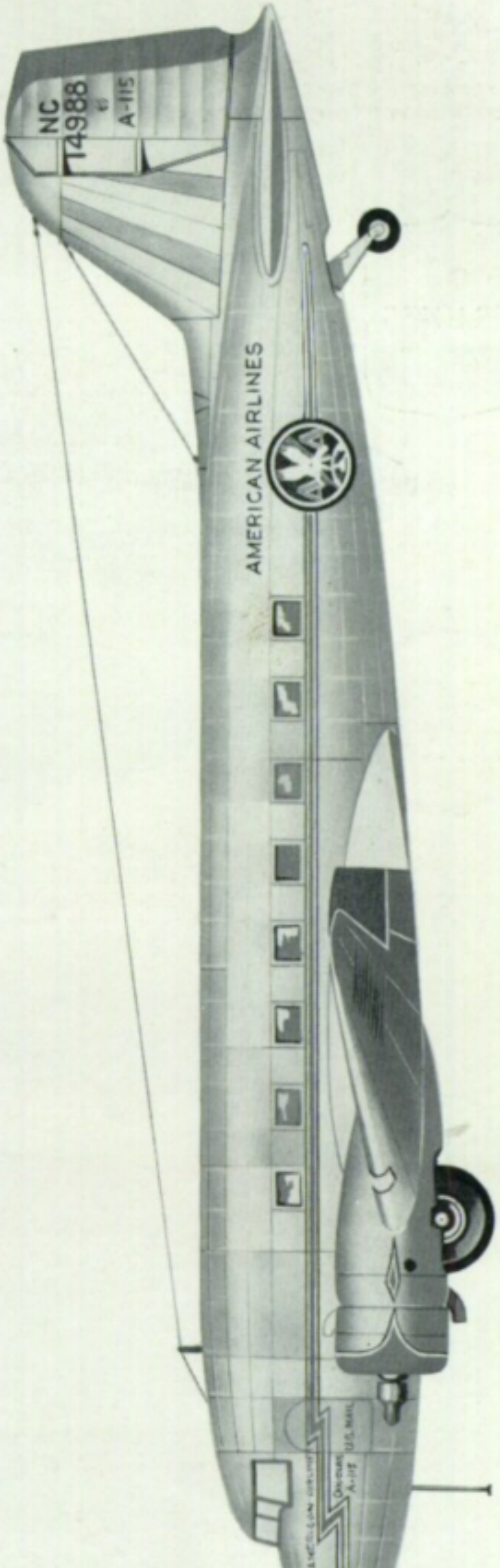
# PROFILE PUBLICATIONS

# The Douglas DC-3 (pre-1942)


NC 14988
A-115
AMERICAN AIRLINES
U.S. MAIL

NUMBER 96

TWO SHILLINGS

*Douglas DC-3-G102-277B, c/n 2198,* NC21793 *of American Airlines in flight. This machine was completed at Santa Monica on 24th February 1940.*
(Photo: American Airlines)

# The Douglas DC-3

## by Arthur Pearcy

As its design implies, the DC-3 was the third commercial model developed by the Douglas Aircraft Company. A couple of years earlier in 1933, Douglas, then a comparatively small manufacturer specialising in torpedo and observation aircraft for the American armed forces, had bid successfully for a new passenger aircraft ordered by Transcontinental & Western Airlines. Known as the DC-1 in the earliest model, and as the DC-2 after it went into quantity production, this first Douglas entry into the transport field revolutionised the industry.

However, the DC-2 was not alone. In 1932 Boeing had introduced the first really modern airliner, the 247. Of all-metal construction, this advanced twin-engined monoplane carried ten passengers and a crew of two at a top speed of nearly 180 m.p.h. The new airlines were not slow to realise its tremendous capabilities and United Air Lines invested $4,000,000 on a fleet of no less than sixty of these machines.

Jack Frye, vice-president of T.W.A. a newly formed airline operating noisy Ford and Fokker tri-motors, visualised the present and future needs of T.W.A. and wrote to his friend Donald Douglas with a specification for a new transport aircraft. This historic letter formed the birth certificate of the DC-1, forerunner of the famous DC-3.

With the introduction of the Boeing 247 and DC-2 fierce competition raged in air transport. Among the operators who were losing heavily to their better equipped competitors was American Airlines, whose slow old Curtis Condors were flying almost empty, despite the attraction of the sleeper berths with which they were fitted. From the date of its formation on 13th May 1934 to the end of that year, the company had lost over one million dollars flying its fourteen passenger Condors, twelve passenger Fokkers and a variety of smaller aircraft—most of them empty—over their 4,000 odd miles of route.

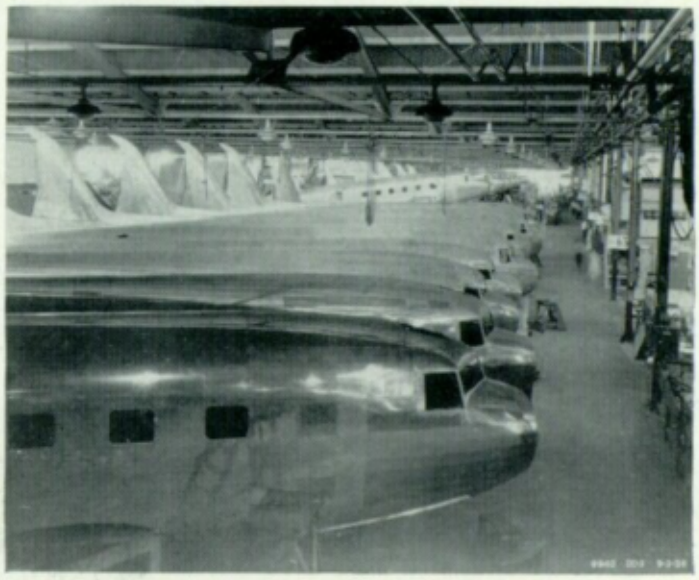
But as good as the DC-2 was, American decided it wanted something better. They wanted to retain their luxury sleeper traffic, and the DC-2 was just too narrow to accommodate a comfortable berth. One summer afternoon in 1935, President C. R. Smith, telephoned Donald Douglas from Chicago. What American wanted, specifically, was a larger, more comfortable plane which could lure the luxury trade.

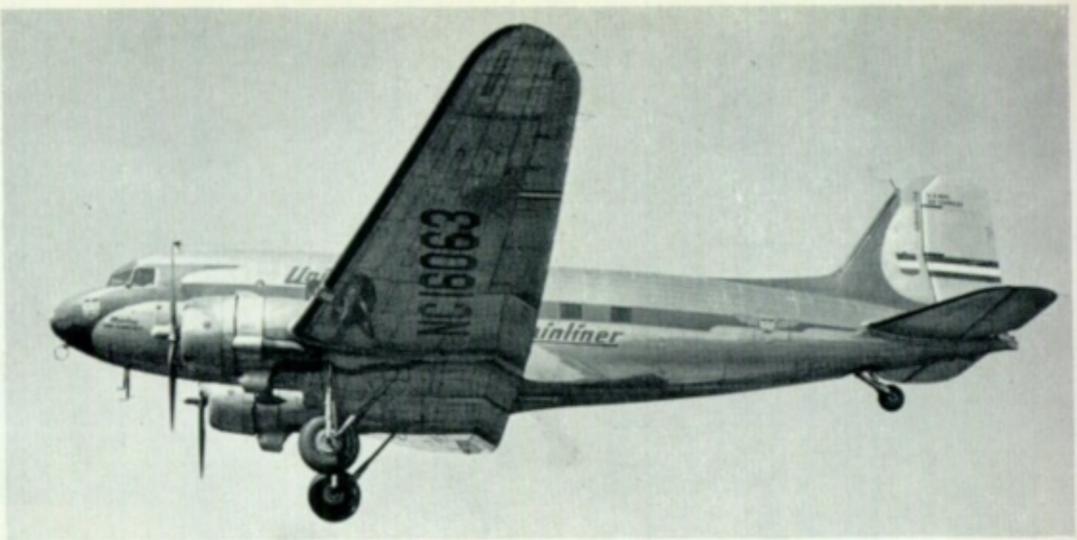
Douglas already had more DC-2 orders than he could handle, so was reluctant to take on any new headaches, but eventually he was persuaded to try. American agreed to buy twenty of them, with an option of twenty more, at a price of $110,000 each. In those days the aviation business was so run that this $2,000,000 plus contract was accepted over the phone by Douglas, with nothing on paper until months after the first aircraft had been delivered.

With Fred Stineman of Douglas as project chief, engineers from the airline and manufacturer worked together for the rest of 1935 on the designs for the new transport. William Littlewood, American Airlines chief engineer, spent most of his time at the Douglas plant, and the success of the design owes much to his co-operation. It was known then as the Douglas Sleeper Transport, or DST, and incorporated a number of ideas borrowed from the Pullman Company, of railway fame. The initial layout had seven upper and seven lower berths, with a separate private cabin up front for honeymoon couples. The wider fuselage was combined with the nose, undercarriage and wings of the DC-2, using larger wingtips to extend the span from 85 to 95 ft., since the gross weight had gone up to 24,000 lb. The length was increased from 62 to 65½ ft. It was powered by two 900-h.p. Wright Cyclone engines giving a cruising speed of 180 m.p.h., the increased power being matched by larger tail surfaces. The new aircraft could carry a useful payload of 9,000 lb. and a gross weight of 25,000 lb.

It was realised that by taking out the berths they could make room for a third row of seats, two on one

*The Douglas DC-3/DST production line at Santa Monica in September 1936. Deliveries averaged six aircraft per month.*
(Photo: Douglas)





*Mainliner "San Francisco"—DC-3A c/n 1903 on final approach at Oakland Airport, California, 1940.*
(Photo: William T. Larkins)

side of the aisle and one on the other, instead of just the two rows in the DST dayplane Boeing 247 and DC-2. The 50 per cent increase in payload, from 14 to 21 passengers, could comfortably be lifted by the bigger engines, yet its operating cost would be only 3 per cent higher than that of the DC-2. Thus was born the DC-3, the most successful transport aircraft ever built, and the first to carry enough passengers comfortably and at low enough fares to allow air transport to really develop.

## FIRST FLIGHT AND INTO SERVICE

The logbook for the prototype machine, registered X14988, type DST, serial No. *1494*, begins with an entry on 14th December 1935 recording a three-hour run up on each of the Cyclone engines. On 16th December the run up was repeated and on 17th December, after each engine had been run up for 30 minutes by Crewchief Woolfolk, the aircraft taxied out at Clover Field, now Santa Monica, and took off at 3 p.m. Touchdown was at 4.40 p.m just as it was getting dusk. The pilot was Carl A. Cover who had flown the DC-1 on its maiden flight. He was accompanied by engineers Fred Stineman and Frank Collbohm. Everything went smoothly.

17th December 1935 incidentally, was the thirty-second anniversary of the Wright Brothers historic "First Flight".

Carrying the livery of American Airlines, the aircraft was retained by Douglas for test flying before being handed over to the airline on 11th July 1936 as *NC14988* "Flagship Texas".

The DC-3 was not only bigger than the DC-2 but also much easier and safer to fly. The automatic pilot, then only recently developed by the Sperry Gyroscope Company, was installed as standard equipment. Two sets of instruments were installed in the cockpit, each independent of the other; if one set went unserviceable the other was there for an emergency. Because the airlines were beginning to go in for night flights, special lights to illuminate the instrument panel were designed. So excellent was the design that the basic specifications for the aircraft were never changed—a rare thing in aviation. The DC-3 was an immediate success.

The first American Airlines DC-3 went into service on 7th June 1936 on the non-stop New York to Chicago route. Orders poured in from other U.S. and foreign airlines. The speed with which the airline industry converted to DC-3s seemed limited only by the rate at which Douglas could produce them at Santa Monica.

*The first DC-3, c/n 1494, carried out development flying as* X14988. *It is seen here at its birthplace, Santa Monica, California, during 1935.* (Photo: William T. Larkins)

*The first DC-3 in full airline livery, as* NC14988 *of American Airlines, in June 1936.* (Photo: Douglas No. 9621)

NC 16002
Buy War Bonds
AMERICAN
Flagship Airfreighter

*"Flagship Airfreighter"—American Airlines'* NC16002, *c/n 1496, in war paint. Note pennant above cabin.*
(Photo: American Airlines via J. F. Dial)

Not only was the DC-3 larger, faster, and more luxurious than any previous aircraft, but it was also more economical to operate. Costs per seat-mile were about a third less than those of its predecessor, the DC-2. Standardisation on the DC-3 reduced maintenance and other costs and boosted safety records.

Within a few months of the DC-3s introduction into scheduled service the president of United Air Lines, W. A. Patterson, was forced to admit that the days of their Boeing 247s were numbered. The new DC-3 was knocking 60 minutes off the journey time, making money as fast as the 247s lost it. United purchased a new fleet of DC-3s powered by Pratt & Whitney engines, the first going into service on 30th

NC 16013
AMERICAN

*American Airlines* NC16013, *c/n 1551, was named "Flagship Virginia"; she is seen here seconds after take-off.* (Photo: American Airlines via J. F. Dial)

June 1937. It was not long before the airline again had figures on the profit side of their ledger.

Three years to the day, on Wednesday 1st July 1936, after the DC-1 had made its first flight, the DC-3 received recognition as the "outstanding twin-engined commercial transport plane". Those were the words that President Roosevelt read from the citation when he presented Donald W. Douglas with the Collier Trophy at the White House. "This airplane," the script recounted, "by reason of its high speed, economy, and quiet passenger comfort, has been generally adopted by transport lines throughout the United States. Its merit has been further recognised by its adoption abroad, and its influence on foreign design is already apparent. In making this award, recognition is given to the technical and production personnel of the Douglas organisation."

There was even more pleasing news. That same day an American Airlines DC-3 "Flagship", had flown non-stop from Newark to Chicago and return, 1,472 miles in just over eight hours, and the airline announced it would begin non-stop service between the two cities that very week.

The public liked the DC-3's luxury and her club-lounge atmosphere, including such innovations as electric razors; meals served on tables with silverware, real china, and linen; and air conditioning at terminals and aloft.

Air traffic more than doubled in the two years after the opening of the DC-3 service, taking the airlines a long step forward on the road to solvency. C. R. Smith president of American Airlines speaking at a businessmen's gathering in New York City said, "The DC-3 freed the airlines from complete dependence upon government mail pay. It was the first airplane that could make money just by hauling passengers."

*Tail of Transcontinental and Western Air Inc's* NC17312 *"Sky-sleeper". The aircraft, c/n 1922, was built in February 1937.* (Photo: via R. W. Harrison)

NC 17312
SKY-SLEEPER
350
TWA

KONINKLIJKE LUCHTVAART MAATSCHAPPIJ
PH-ALI

*The first DC-3 in Europe; c/n 1590, built in 1936, and flown as* PH-ALI *by K.L.M. This aircraft was shot down in 1943 when bearing the registration* G-AGBB. (Photo: K.L.M.)

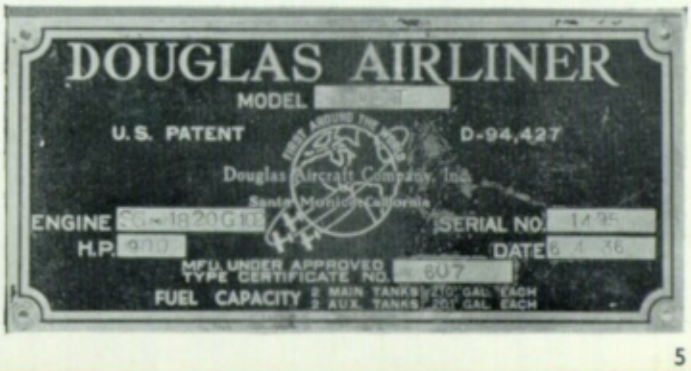
At Santa Monica orders for the DC-3 were flowing in. United Air Lines ordered more of the version with Pratt & Whitney Twin Wasp engines, this being designated DC-3A, and by December 1941 had a fleet of 39 DC-3As and 15 DSTs.

Eastern Air Lines had acquired its first two DC-3s in 1936. The following year it retired five of its Lockheed Electras and purchased eight new DC-3s. Air traffic was so great during 1938 that Eastern had to lease four DC-3s from United Air Lines for use during the peak winter season. By 1941 a fleet of 35 aircraft were in regular use with this airline, all DC-3s.

In August 1939 Braniff announced the purchase of four new 21-passenger DC-3 airliners at a cost of approximately $100,000 each. The first DC-3 "Super B-liner", as they were called, was received by Braniff in Oklahoma City, and was put into regular scheduled service between Dallas and Amarillo on 3rd February 1940. By July 1940 Braniff had retired its Lockheed Electra and was operating 30 daily flights with DC-2 and DC-3 aircraft. By 1938 the 350th aircraft had been delivered.

Progress with air transport was being felt elsewhere. In South America Panagra (Pan American Grace Airways) replaced its slow and noisy Ford tri-motors, Panair do Brasil with its large Sikorsky S.42 flying boats reverted to land planes, whilst the Electras and Lodestars of Linea Aeropostal Venezolana (L.A.V.) disappeared in a huge modernisation programme. All chose the now familiar DC-3. Even

*Maker's plate of the second DC-3 built, a DST model c/n 1495, built 4th June 1936. Actual plate now held by William T. Larkins.*



United Air Lines
Mainliner

*United Air Lines'* NC18105 *"State of Ohio" in flight, a DST built mid-1937.* (Photo: U.A.L.)

the Boeing 247Ds of Compania Mexicana de Aviacion (C.M.A.) were gradually replaced with the DC-3.

1936 was an important year for Australian National Airways, for in June they introduced the first Douglas aircraft into the country after exerting considerable pressure on the government to remove the ban on American aircraft imports. Four DC-3s made their appearance in December 1937. *VH-UZJ/VH-UZK* c/n 2002/3 and *VH-ABR/VH-ABC* c/n 2029/30.

By 1938 the DC-3 was carrying 95 per cent of all commercial air lines traffic in the U.S.A. alone, and was in service with 30 foreign air lines throughout the world. By 1939, 90 per cent of the world's airline business was being flown in DC-3s.

## EARLY TROUBLES

There were crashes. In December 1936 came the first fatal accident to a Douglas transport. A brand new United Air Lines DC-3 was coming in for a landing at San Francisco airport, when it plunged into the bay and all on board were drowned. The weather was clear at the time, the aircraft was on its correct approach path, and was commanded by one of United's best pilots. The aircraft was salvaged from the sea bed and it was found that the co-pilot's microphone had dropped on to the floor and jammed the controls, so that they had been unable to pull out of their glide.

In 1937, the airlines had a rough year, weather being exceptionally bad all over the U.S.A. American Airlines lost a "Flagship" shortly after the airline inaugurated its DC-3 service and United Air Lines lost another in the Rocky Mountain region. Eddie Rickenbacker was almost killed in the first fatal accident involving a DC-3 of the Eastern Air Line "Great Silver Fleet". And there were others, but the aircraft themselves were exonerated in the investigations, and there were no indications of structural failures. The safety record which the DC-3s established even converted insurance companies to selling policies to air travellers while pilots for the first time could get insurance, without paying added risk premiums. In 1939, the Scheduled Airlines of the U.S.A. received the Collier Trophy for flying seventeen months without a single fatality.

There have been numerous instances, when DC-3s continued to fly even after aerial collisions or damage received whilst on the ground.

During the summer of 1941 a DC-3, one of the fleet of six operated by the China National Aviation Corporation, on a flight from Hong Kong to Chungking, made a forced landing at Suifu because of a Japanese air raid. Five Jap bombers spotted and strafed the helpless aircraft. When the smoke had cleared away the right wing was blasted off and there were more than fifty holes in the fuselage. Captain H. L. Woods, the pilot, called Hong Kong asking that a new wing be flown out. The only wing available was that from a DC-2 which was five feet shorter and designed to carry several thousand pounds less weight than a DC-3 wing.

In Hong Kong, C.N.A.C. maintenance men bolted the wing under the fuselage of another DC-2 and flew it 900 miles to the airport at Suifu, where they attached it to Wood's DC-3. The aircraft looked a little lopsided, but it took off and flew beautifully after the necessary aileron trim tab adjustment. It was christened the DC-2½.

There was the bird strike hazard. On 20th October 1941 American Airlines "Flagship Erie" *NC25663* c/n 2207 hit a flock of wild geese and crashed at New

Left: *An unlucky landfall; DC-3 c/n 2036,* PH-ASK *"Kemphaan" of K.L.M., displays the orange scheme adopted in September 1939 as it rests on the runway at Norway's Oslo-Fornebou airport. In the background is a Heinkel He 111P of the* Luftwaffe; *the Douglas was caught on the ground on the first day of the German invasion, and later pressed into* Luftwaffe *service as* NA + LB. (Photo: Schmetz via Seeley.) Right: *One of three C-49Bs (ex-DC-3, c/n 4095) built during early 1941 seen at San Francisco in August of that year.* (Photo: William T. Larkins)

HOLLAND
PH-ASK

London, Ontario, killing all seventeen passengers and crew of three. The DC-3 had been delivered to the airline on 21st March 1940 and had logged 3,868 hours.

## LICENCE TO BUILD

Licence to manufacture the DC-3 outside the U.S.A. was granted to the Dutch Fokker company, but they never went into production. Instead Fokker became the Douglas agent in Europe, and so handled all the DC-3s which were shipped over from the U.S.A. to the ports at Rotterdam and Cherbourg. After final assembly the aircraft were delivered to the airlines; these included K.L.M. in Holland, A.B.A. in Sweden and many other of the European operators of the DC-3. Sales were so good that Fokkers held a pool of DC-3s, and it will be noted from the production lists that they purchased five out of the first 100 aircraft to be produced. The purchase price of a DC-3 was then approximately £30,000 or $115,000.

Nakajima in Japan also obtained a licence to manufacture the DC-3, and on 30th September 1938 the assembly of the first aircraft was completed at Haneda Airport for Dai-Nippon Airways.

A third licensee was the State Aircraft Plant in the U.S.S.R. who not only bought large quantities of jigs and tools from the U.S.A., but purchased a total of eighteen DC-3s from Santa Monica between November 1936 and March 1939. These were delivered by Douglas in the name "North Eastern" and "Excello", both of which were represented by Amtorg the pre-war purchasing agency. There is considerable reason to believe that the "Airlines" were paper organisations of the Russian Government. The first aircraft was c/n 1589 registered *NC14995* in the U.S.A. with Excello, followed by a block of eleven delivered between May and August of 1938 and concluded with a block of six, the last of which was delivered in March 1939. Of the eighteen DC-3s, two were delivered disassembled, ostensibly for use as spare parts.

The State Aircraft Plant's leading aviation expert, Boris Lisunov, spent two years studying with the Douglas Company at Santa Monica, before returning to Russia to supervise production. Small scale production did not commence until 1940, but it is believed that by the summer of 1941 about thirty to forty aircraft per month were being produced in Russia. Designated the PS-84 and later the Lisunov Li-2 the aircraft was for use by Aeroflot the Russian State airline.

## EUROPEAN OPERATORS

Under the leadership of its first managing director, Albert Plesman, Holland's K.L.M. began to consider the impressive developments in air transport being made by the American West Coast manufacturer, Donald Douglas. This resulted in their combined entry with Douglas for the England to Australia race, and as a direct sequel, their order for DC-2 and later DC-3 aircraft, thus opening the way for a major invasion of Europe by Douglas.

From this time K.L.M. set the pace in Europe, and two years later, in 1936, an initial order was placed for eleven DC-3s with thirteen more to follow. Thus K.L.M. became the first European operator of the type.

K.L.M. operated DC-3s on the European network (twenty-one-passenger version) from 1936 onwards and on the Amsterdam to Djakarta service (eleven-passenger version) from 1937 to 1942.

In Northern Europe Aktiebolaget Aerotransport (A.B.A.) of Sweden became the second airline in Europe to introduce the DC-3, an indication that Sweden was taking its place among the leading airline countries.

A.B.A. took delivery of its first DC-3 in July 1937 (*SE-BAA* c/n 1947 "Örnen"), the second and third being delivered in September (*SE-BAB* c/n 1972 "Hoken" *SE-BAC* c/n 1975 "Falken"). A fourth DC-3 (*SE-BAF* c/n 2133 "Gladan") was delivered in November 1939, and a fifth (*SE-BAG* c/n 2132 "Gripen" ex *HB-IRU*) was bought from Swissair in May 1940.

Ceskoslovenska Latecka Spolecnost (C.L.S.) joined the Douglas ranks, purchasing both DC-2s and DC-3s to supplement its ex-K.L.M. Fokker aircraft. DC-3s included *OK-AIH* c/n 1973, *OK-AIE* c/n 2023, *OK-AIF* c/n 2024 and *OK-AIG* c/n 2095.

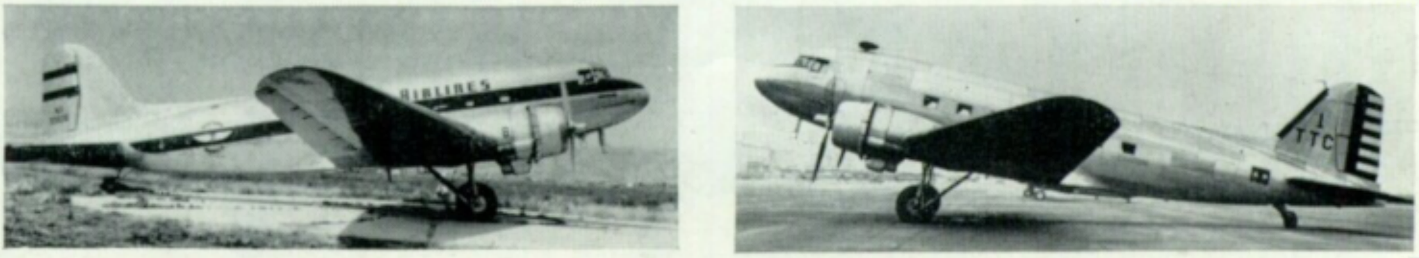
On 26th March 1931 two Swiss companies, Balair and Ad Astra combined to form Schweizerische Luftverkehr (Swissair). In 1932 Swissair followed K.L.M. with the purchase of the DC-2 and later the DC-3. The first two DC-3s (*HB-IRA* c/n 1945 *HB-IRI* c/n 1946) were delivered in June 1937 followed by a third aircraft (*HB-IRO* c/n 2054) in February 1938. Two more (*HB-IRU* c/n 2132 *HB-IRE* c/n 2121) were delivered in July 1939.

During 1935 Air France purchased a DC-2 from Douglas, and their one and only DC-3 (*F-ARQJ* c/n 2122) was registered on 2nd April 1939.

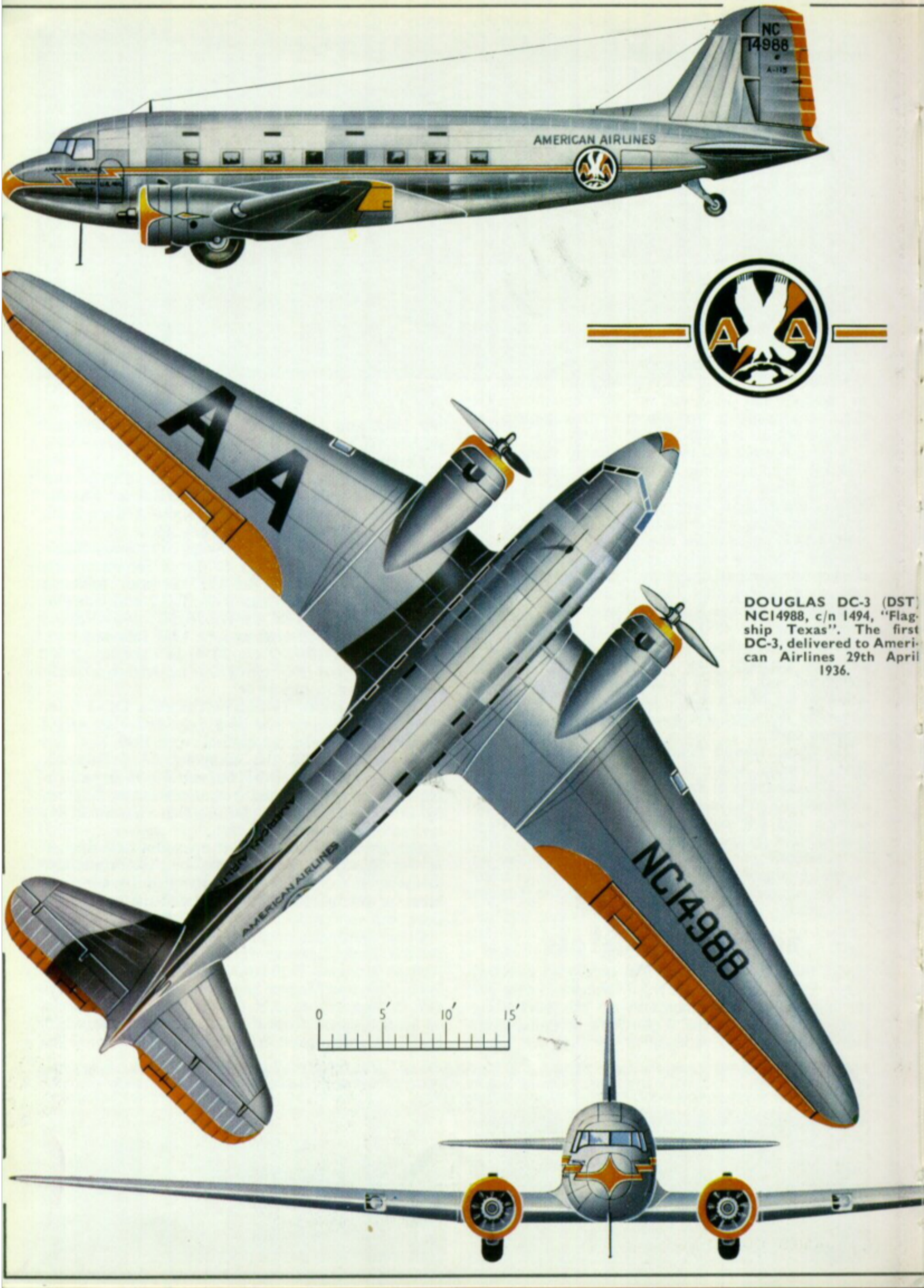
In January 1939 the components of Sabena's first Douglas DC-3 (*OO-AUH* c/n 2093) arrived by sea in packing cases, and was assembled in Belgium by Fokker. The second DC-3 (*OO-AUI* c/n 2094) arrived during the same month.

The arrival of these aircraft opened a new chapter in the history of Belgian aviation. Unfortunately, however, the chapter was interrupted by the outbreak of war on 10th May 1940 and the company's European services were then paralysed.

Other European operators of the DC-3 included Polskie Linie Lotnicze (L.O.T.) in Poland, Linile Aeriene Romaue Exploatate cu Statul (L.A.R.E.S.) in Hungary and Magyar Legiforgalmi (M.A.L.E.R.T.) also in Hungary. Several DC-3s were in the process of being shipped from the U.S.A. to Europe when hostilities commenced in September 1939.



Left: NX33606 *(later* NC33606*) c/n 4806 "Maunoloa" of Hawaiian Airlines at Oakland, California, 27th August 1941. Rare photo of a C-48,* 41-7681, *c/n 3256, carrying two-star General insignia, probably of Technical Training Command. This aircraft, originally built for T.W.A., was photographed at Oakland during November 1941.* (Photos: William T. Larkins)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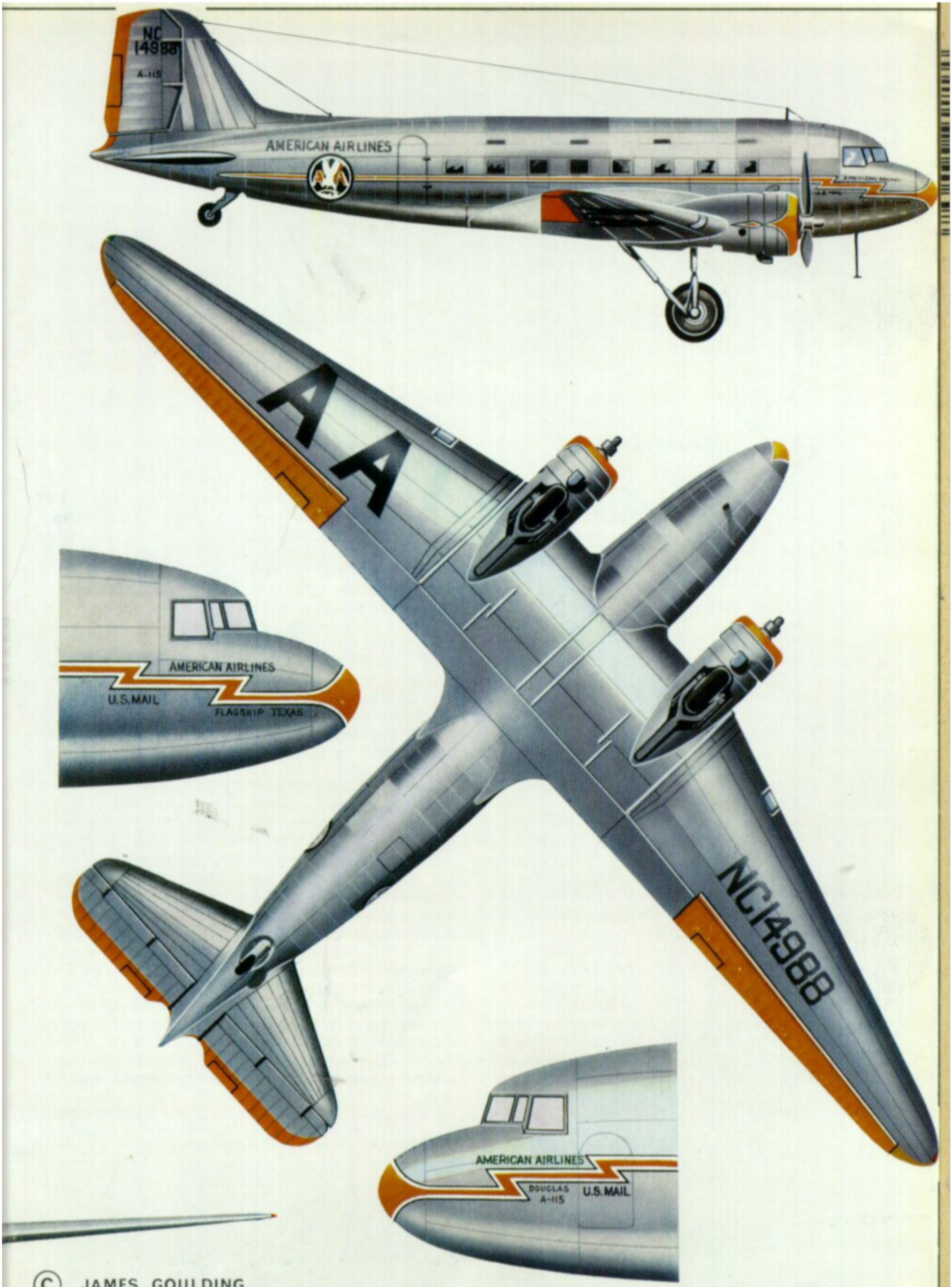
**DOUGLAS DC-3 (DST) NC14988, c/n 1494, "Flagship Texas". The first DC-3, delivered to American Airlines 29th April 1936.**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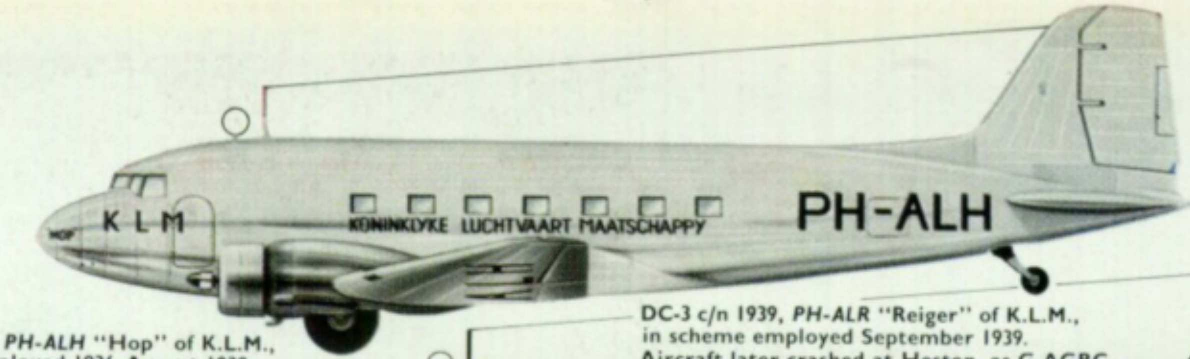
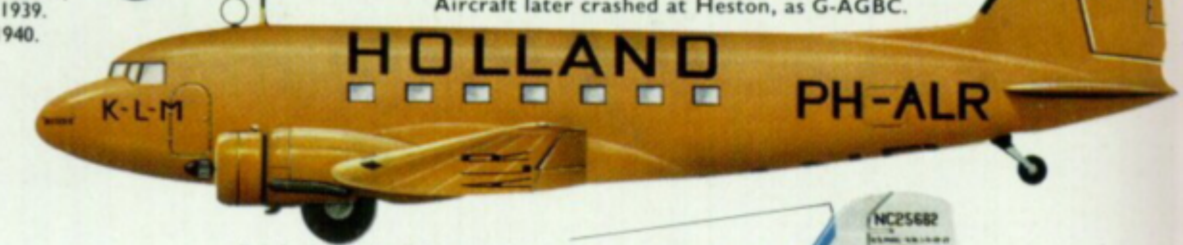
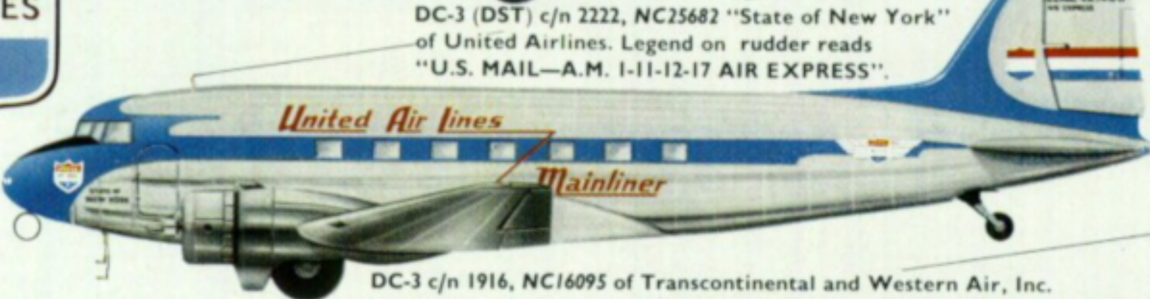

K L M
KONINKLYKE LUCHTVAART MAATSCHAPPY
PH-ALH

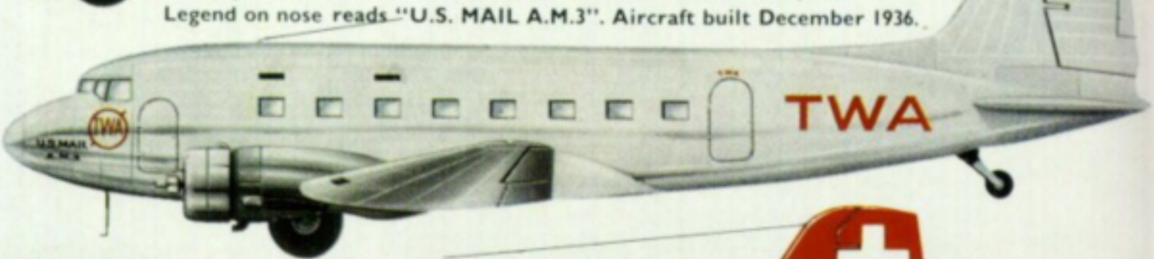
DC-3 c/n 1935, *PH-ALH* "Hop" of K.L.M., in scheme employed 1936–August 1939. Aircraft captured by *Luftwaffe* in 1940.


HOLLAND
K-L-M
PH-ALR

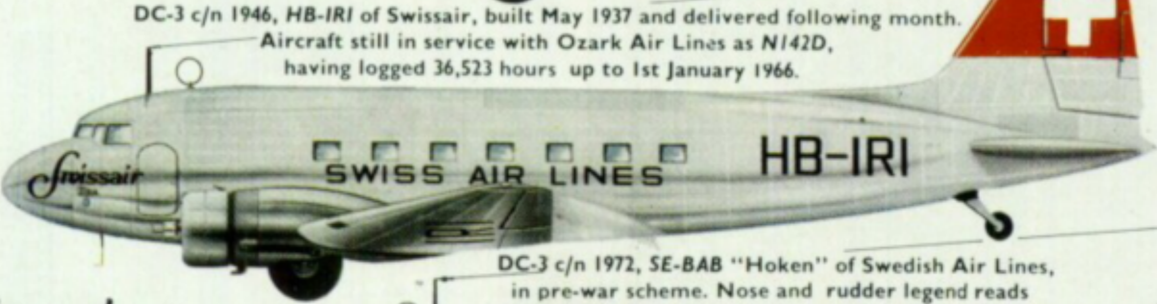
DC-3 c/n 1939, *PH-ALR* "Reiger" of K.L.M., in scheme employed September 1939. Aircraft later crashed at Heston, as G-AGBC.


NC25682
United Air Lines
Mainliner

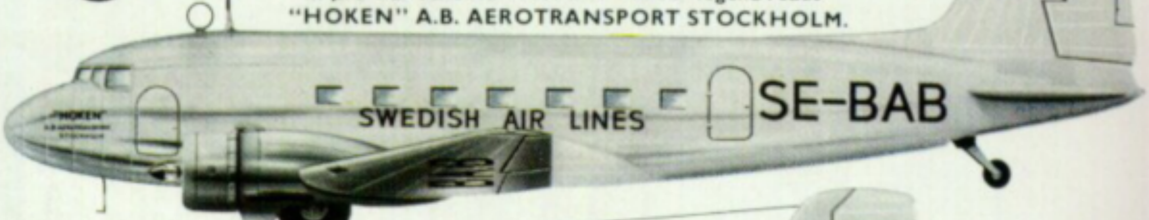
DC-3 (DST) c/n 2222, *NC25682* "State of New York" of United Airlines. Legend on rudder reads "U.S. MAIL—A.M. 1-11-12-17 AIR EXPRESS".


NC16095
TWA
U.S. MAIL A.M.3

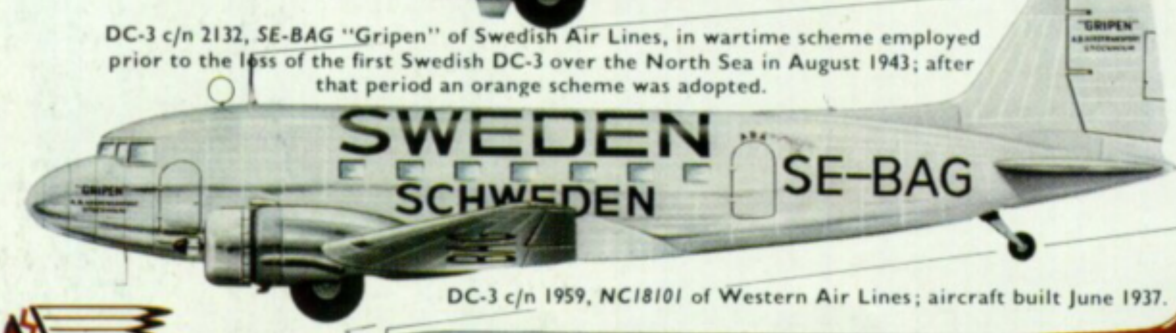
DC-3 c/n 1916, *NC16095* of Transcontinental and Western Air, Inc. Legend on nose reads "U.S. MAIL A.M.3". Aircraft built December 1936.


Swissair
SWISS AIR LINES
HB-IRI

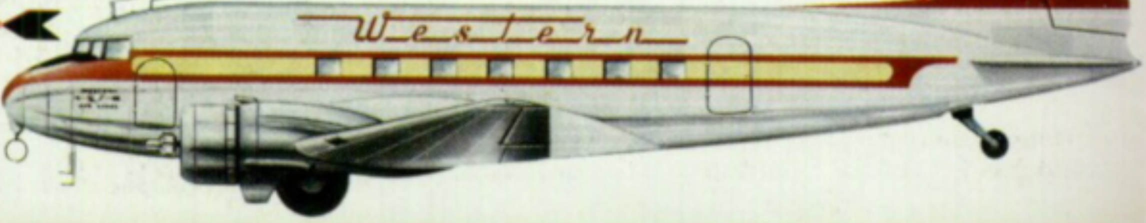
DC-3 c/n 1946, *HB-IRI* of Swissair, built May 1937 and delivered following month. Aircraft still in service with Ozark Air Lines as *N142D*, having logged 36,523 hours up to 1st January 1966.


HOKEN
SWEDISH AIR LINES
SE-BAB

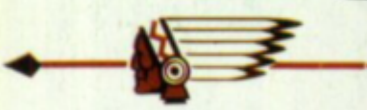
DC-3 c/n 1972, *SE-BAB* "Hoken" of Swedish Air Lines, in pre-war scheme. Nose and rudder legend reads "HOKEN" A.B. AEROTRANSPORT STOCKHOLM.


GRIPEN
SWEDEN
SCHWEDEN
SE-BAG

DC-3 c/n 2132, *SE-BAG* "Gripen" of Swedish Air Lines, in wartime scheme employed prior to the loss of the first Swedish DC-3 over the North Sea in August 1943; after that period an orange scheme was adopted.

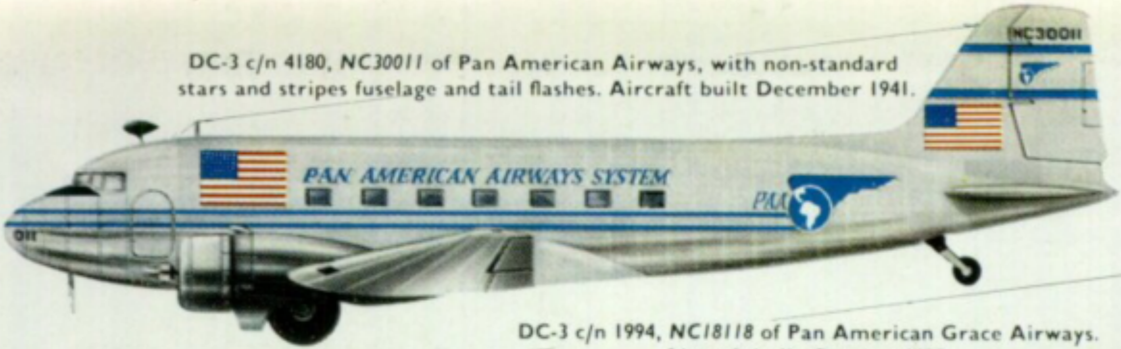

NC 18101
W
Western

DC-3 c/n 1959, *NC18101* of Western Air Lines; aircraft built June 1937.



*NC18101* nose emblem.

DC-3 c/n 4180, *NC30011* of Pan American Airways, with non-standard stars and stripes fuselage and tail flashes. Aircraft built December 1941.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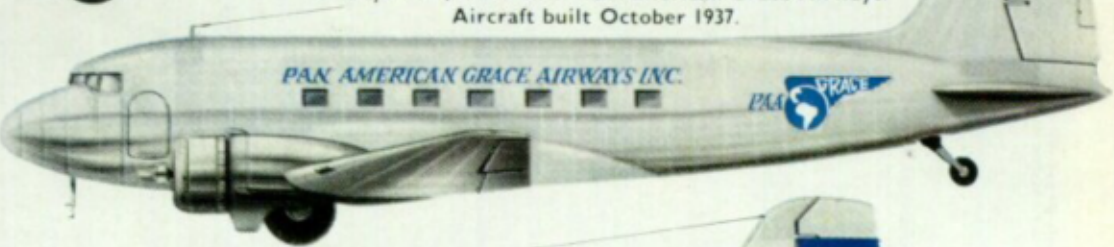
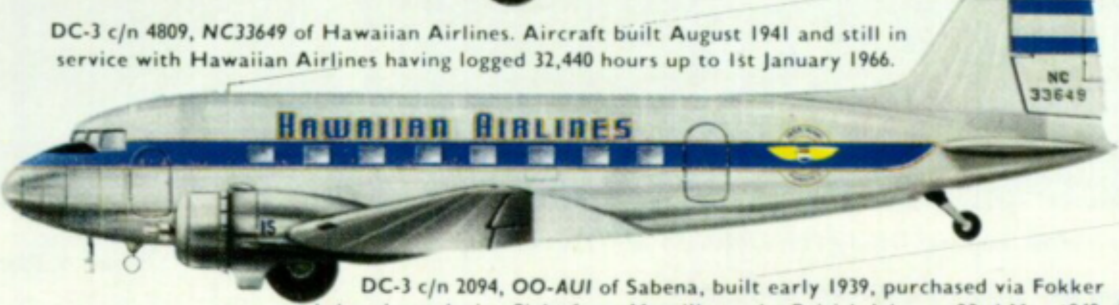
011

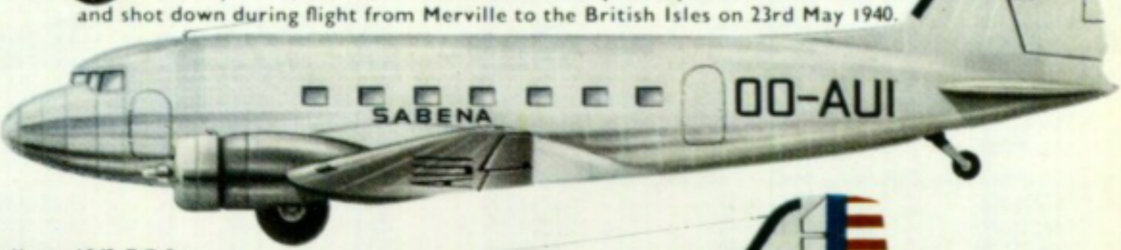
DC-3 c/n 1994, *NC18118* of Pan American Grace Airways. Aircraft built October 1937.

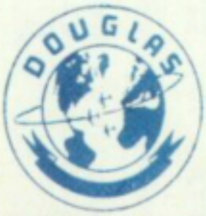

NC18118
PAN AMERICAN GRACE AIRWAYS INC.
PAA
GRACE

DC-3 c/n 4809, *NC33649* of Hawaiian Airlines. Aircraft built August 1941 and still in service with Hawaiian Airlines having logged 32,440 hours up to 1st January 1966.

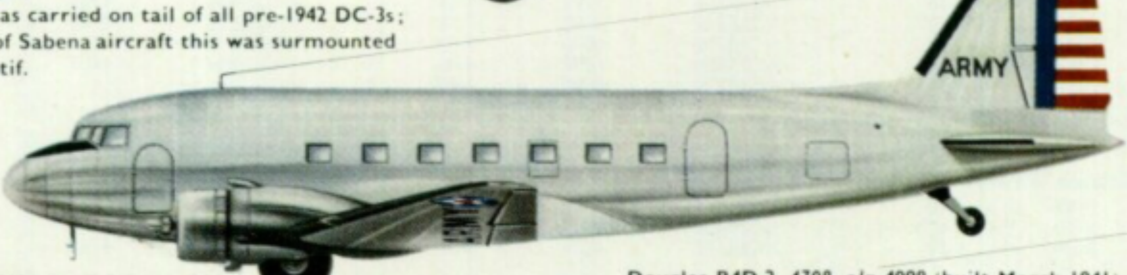

HAWAIIAN AIRLINES
NC
33649
15

DC-3 c/n 2094, *OO-AUI* of Sabena, built early 1939, purchased via Fokker and shot down during flight from Merville to the British Isles on 23rd May 1940.


OO-AUI
SABENA

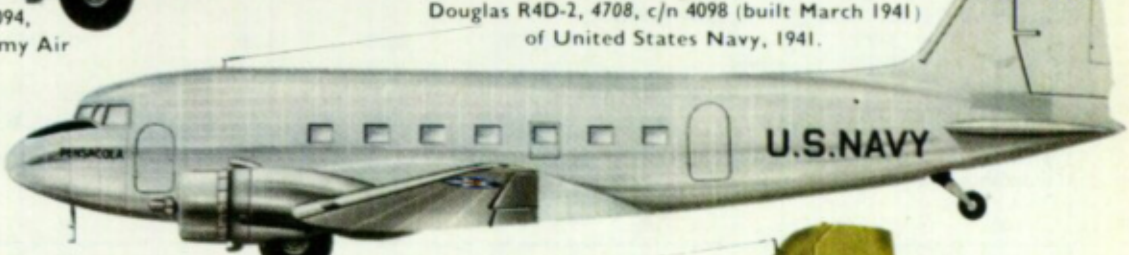


Douglas emblem, as carried on tail of all pre-1942 DC-3s; note that in case of Sabena aircraft this was surmounted by the Fokker motif.



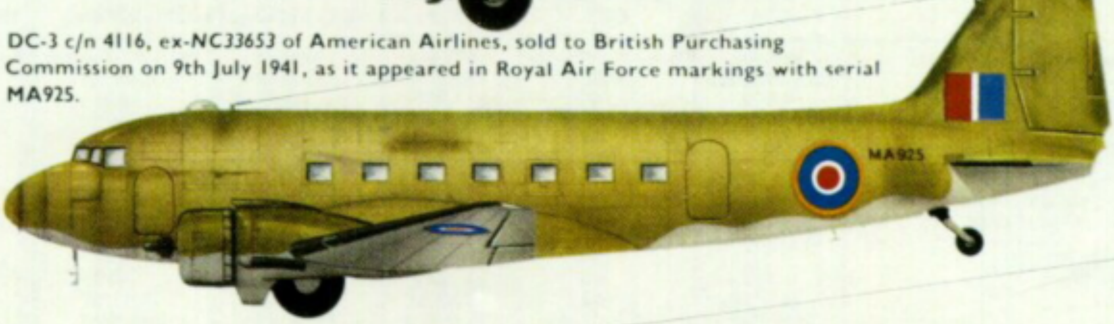
Douglas C-49B *41-7691* (ex-DC-3 c/n 4094, built early 1941) of United States Army Air Corps, 1941.

Douglas R4D-2, *4708*, c/n 4098 (built March 1941) of United States Navy, 1941.

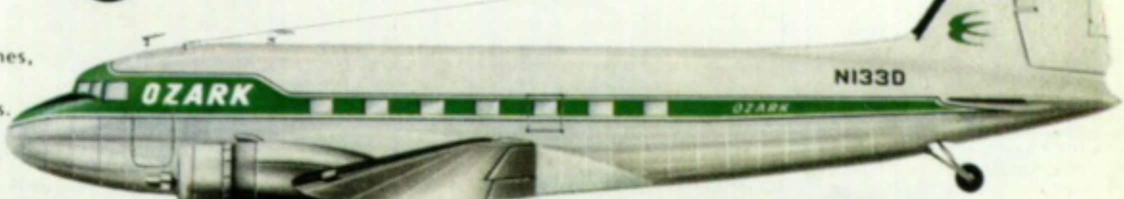

4708
R4D-2
U.S.NAVY
PENSACOLA

PENSACOLA on nose.

DC-3 c/n 4116, ex-*NC33653* of American Airlines, sold to British Purchasing Commission on 9th July 1941, as it appeared in Royal Air Force markings with serial MA925.



DC-3 c/n 1499, *N133D* of Ozark Air Lines, the oldest DC-3 still flying on regular scheduled commercial air line services. The sixth aircraft produced, this machine was originally built as a DST for American Airlines in 1936; up to 1st January 1966 it had logged 60,591 flying hours.


OZARK
N133D
OZARK

## K.L.M. FLEET

| Reg. | c/n | Name | Del. date | Remarks |
|---|---|---|---|---|
| *PH-ALI* | 1590 | "Ibis" | 21.9.36 | |
| *PH-ALH* | 1935 | "Hop" | 18.3.37 | |
| *PH-ALN* | 1936 | "Nandoe" | 23.3.37 | to Far East as *PK-ALN* 1.6.40 |
| *PH-ALO* | 1937 | "Oehoe" | 27.3.37 | to Far East as *PK-ALO* 1.6.40 |
| *PH-ALR* | 1939 | "Reiger" | 8.4.37 | |
| *PH-ALS* | 1940 | "Specht" | 1.4.37 | crashed in Indonesia 6.10.37 |
| *PH-ALT* | 1941 | "Torenvalk" | 10.4.37 | to Far East as *PK-AFW* 2.6.40 |
| *PH-ALU* | 1942 | "Uil" | 15.4.37 | |
| *PH-ALV* | 1943 | "Valk" | 23.4.37 | |
| *PH-ALW* | 1944 | "Wielewaal" | 25.4.37 | to Far East as *K-ALW* 1.6.40 |
| *PH-ALP* | 1965 | "Pelikaan" | 25.8.37 | to Far East as *PK-AFV* 2.6.40 |
| *PH-ARB* | 1980 | "Buizerd" | 27.8.37 | |
| *PH-ARE* | 1981 | "Emoe" | 28.8.37 | to Far East as *PK-AFZ* 2.6.40 |
| *PH-ARG* | 1982 | "Gier" | 1.9.37 | to Far East as *PK-ARG* 1.6.40 |
| *PH-ARW* | 2019 | "Wulp" | 23.2.38 | |
| *PH-ARX* | 2020 | "Xema" | 9.3.38 | |
| *PH-ARY* | 2021 | "Ijsvogel" | 18.3.38 | crashed Schiphol 14.11.38 |
| *PH-ARZ* | 2022 | "Zilverreiger" | 2.4.38 | |
| *PH-ASK* | 2036 | "Kemphaan" | 21.4.38 | |
| *PH-ASM* | 2042 | "Mees" | 21.7.38 | |
| *PH-ASP* | 2109 | "Patrijs" | 10.3.39 | |
| *PH-ASR* | 2110 | "Roek" | 10.3.39 | |
| *PH-AST* | 2111 | "Tapuit" | 10.3.39 | |
| *PH-AXH* | 2147 | "Havik" registered to K.L.M. 17.12.39 but never delivered; sold to United Air Lines during April 1940 as *NC25675*. | | |

## WAR CLOUDS

In September 1939 just when the whole world was about to be covered by an inter-connecting air transport system, the nations divided themselves again in hostilities. By 1941 every great trading and commercial country was involved in active military operations, or was under the complete domination of the Axis Powers. The few neutral nations such as Sweden and Switzerland lived an uneasy life between the belligerents. Swissair retained two DC-3s in flying condition for occasional flights undertaken on behalf of the International Red Cross, and put the rest of its fleet in storage.

All the European services of K.L.M. were stopped on 23rd August 1939 except those to Scandinavia, Belgium and London. The Scandinavian service closed down on 9th April 1940, the Belgium on 18th April and finally on 10th May 1940 all European services were terminated and the Germans occupied the Netherlands. On that fatal day four K.L.M. DC-3s were destroyed by German Air Force bombing at Schiphol Airport—*PH-ALU*, *PH-ARX*, *PH-ASP* and *PH-AST*. A further four were captured intact by the German Air Force when they reached Schiphol and Amsterdam on 16th May these being impressed into service with the *Luftwaffe*—*PH-ALH* (*PC+EA*), *PH-ALV* (*NA+LC*), *PH-ASM* (*NA+LB*) and *PH-ASR* (*VE+RR*).

Nothing daunted, K.L.M. joined the Allied cause and with four remaining DC-3s fled their stricken country to set up a base at Whitchurch Airport, Bristol. Here the aircraft were allocated British registrations—*G-AGBB* (*PH-ALI*) 25th July 1940, *G-AGBC* (*PH-ALR*) 5th August 1940, *G-AGBD* (*PH-ARB*) 29th July 1940, and *G-AGBI* (*PH-ARW*) 17th August 1940. They opened a service between Bristol and Lisbon in August 1940, but their fleet was reduced by half after *G-AGBC* had to be withdrawn on 21st September after an accident at Heston, followed by the destruction of *G-AGBI* during a German air attack on Whitchurch on 24th November 1940.

On the opening of hostilities, the Sabena fleet left Belgium for the United Kingdom, and were put under requisition and used for military missions over France. On 23rd May 1940—Sabena's seventeenth birthday—the company suffered a grievous war loss, when two Savoia Marchetti's and DC-3 *OO-AUI* were shot down at Merville, France. Two members of the crew were killed and several others wounded.

Later the remaining Sabena aircraft were authorised to proceed to Belgian Africa, and they left the U.K. with an intermediate stop in Algeria. On 27th August 1940 four Savoia Marchetti aircraft were seized by the French Vichy Government authorities at Oran, and handed over to the Italians; at Algiers two more Savoia Marchetti aircraft and the remaining DC-3 *OO-AUH* suffered the same fate.

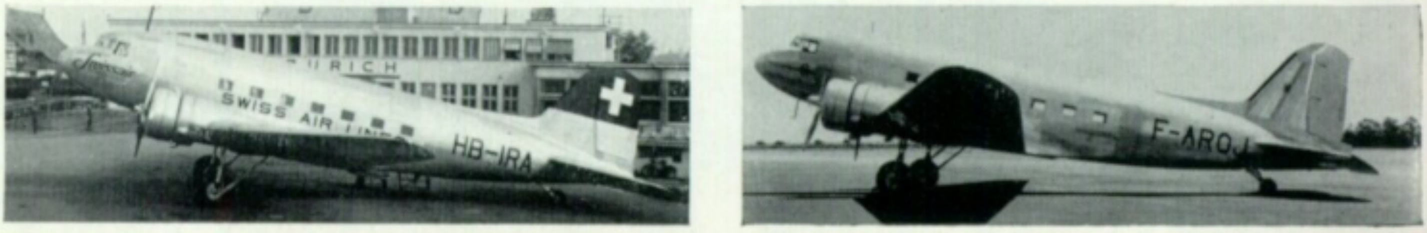
The Swedish airline, A.B.A., tried to maintain its pre-war services with its DC-3 aircraft, and the routes to Moscow, Berlin and London were all kept going under difficulties. For these flights the aircraft were clearly marked with "SWEDEN" in large letters on both sides and under the fuselage.

It is believed that when the Germans overran Czechoslovakia in 1938 the complete DC-3 fleet of C.L.S. was taken over by Tschechiche Luftverkehs Gesellschaft as three DC-3s were later registered with Deutsche Luft Hansa (D.L.H.). *D-AAIE* (*OK-AIE*), *D-AAIF* (*OK-AIF*), and *D-AAIG* (*OK-AIG*).

By as early as July 1940 it is reported that D.L.H. had added at least two ex-K.L.M. DC-3s to its fleet, these being *D-AOFS* (*PH-ASK*) and *D-ABUG* (*PH-ALH*) which the *Luftwaffe* had captured during the invasion of the Netherlands. They had also included six K.L.M. DC-2 aircraft in their haul from Schiphol, which after a period of service with the *Luftwaffe* found their way into the D.L.H. fleet.

It is rumoured that the *Luftwaffe* experienced servicing difficulties with the DC-2s and DC-3s; lack of spare parts led them to provide for interchangeability of certain critical items, as for example—landing gear tyres and wheels were made interchangeable between the Douglas DC-3, DC-2 models, and the Heinkel He.III bomber. Through neutral sources D.L.H. kept their Douglas aircraft

Left: *The first Swissair DC-3, c/n 1945, at Zurich, Dubendorf, shortly after delivery in June 1937. Still in service with Ozark as* N141D, *this veteran has logged 38,574 hours up to 1st January 1966.* (Photo: Swissair.) *The only DC-3 delivered to Air France before the outbreak of war; c/n 2122, built in April 1939, photographed at Santa Monica in its French registration.* (Photo: Douglas)



SE-BAA "*Ornen*" *after and before application of wartime identification markings.* (Photos: *The Aeroplane*, Swedish Air Lines)

modified with all changes recommended by the manufacturer and Civil Aeronautics Board during the war. This was accomplished by contracting for overhaul and other repair work with concerns operating from a neutral country. Through this source replacement parts and other information pertaining to this design were made available.

D.L.H. were not lacking experience of the Douglas type, as during the early part of 1936 they obtained a DC-2 from Fokkers for use in various tests at their airfield Staaken near Berlin.

## INTO UNIFORM

Early Army Air Corps attempts to develop transport aircraft had produced no satisfactory model, and so inevitably they turned to civilian types already in production. The early standby, and indeed the most dependable aircraft within its capacity was the Douglas DC-3 known alternately, according to its special modifications, as the C-47 and the C-53. Long successful in civilian passenger service the twin-engined DC-3 had many features ill-suited to the convenient handling of bulky freight, and its payload was too light for the new tasks. But it was flyable under almost any conditions, was easily maintained, and, above all it was in production.

Air Transport Command borrowed heavily from the civil airlines, which during the 1930s had grown into a large enterprise and an increasingly significant part of the transportation services on which the country depended. From the airlines came experienced executives who were commissioned for key posts of command in the development of a military transport service and veteran pilots who became pioneers of distant military air routes.

Not until the fall of France in the summer of 1940 did the aircraft programme in the U.S.A. include substantial orders for transport aircraft. The Air Corps ordered 545 C-47s in September 1940, and in the following June an order was placed for just under a hundred C-53s, the Army's passenger version of the DC-3. Contracts were signed in September 1941 for fifty more C-53s and for an additional seventy C-47s. Each of these aircraft had been designed originally for passenger service on civilian airways.

All plans for the development of a transport system were dominated by the scarcity of transport aircraft. Transport production still had to compete with that of combat types, which enjoyed, initially at least, an overriding priority. Although a substantial number of C-47s and C-53s had been ordered, none of these had been delivered at the time of the Pearl Harbour attack. The number of medium range transports belonging to the Army Air Corps on 7th December 1941 was so small that the forty to fifty twin-engined C-32s, C-33s and C-39s, all military DC-2s, belonging to the 50th Transport Wing represented very near the full total. Only in the equipment of the civil airlines did the U.S.A. possess an immediate supply of additional transport aircraft.

A first step towards mobilising the resources of the airlines was taken on 13th December 1941, when the President signed an executive order directing the Secretary of War to take possession of any part of any civil aviation system required for the war effort.

As the War Department reached right and left for whatever aircraft might be immediately available, the Army Air Corps enlarged its procurement programme. Fortunately it had made a heavy commitment to the DC-3 before Pearl Harbour, and fortunately the prime consideration of the speed with which the manufacturer could make deliveries led to additional orders. However, the DC-3 was not considered to be an ideal military transport, as it had been designed for civil passenger service.

The DC-3 was a low wing monoplane whose fuselage stood so high off the ground that loading from an ordinary truck platform was impractical. Also the door was narrow and the flooring lacked the strength to support heavy cargo. A larger door, reinforced flooring, special loading equipment, and other improvisations were devised for the C-47. Fortunately most of the design work on the military version had already been completed when the first orders were placed, in 1940, for large numbers of C-47s.

By this time, the Santa Monica factory was already committed to the production of other types, and the C-47 was in consequence produced in a new Douglas plant at Long Beach. The engines of the initial

NC 16019
AMERICAN

*Detail of American Airlines livery displayed by DC-3 c/n 1557.* (Photo: via R. W. Harrison)

version were 1,200-h.p. Pratt & Whitney R-1830-92 engines, whereas most of the commercial DC-3s had Wright Cyclones. The airline interior gave way to utility bucket type seats along the cabin walls and the permissible operating weight increased from 25,000 to 29,300 lb. in the C-47.

Long Beach built 953 C-47s and then changed to the C-47A, which differed significantly only in having a 24 V. electrical system.

The airlines in December 1941 were operating nearly 300 DC-3s, and already a substantial number had been commandeered by Air Transport Command for military service as C-48s, C-49s, C-50s, C-51 and C-52s. Many of these aircraft retained their airline interiors and were used as staff transports.

The Army Air Corps at Wright Field had done static tests with a military DC-2 during 1935, the aircraft finally breaking up under loads three times its design limitations. At this time the cargo version of the commercial DC-3 was taking shape at Santa Monica and naturally the Army Air Corps were interested. Government defence expenditure was centred on bombers, fighters and training types, leaving very little for transport aircraft. It is believed that one or two of the airline DC-3s were purchased from a special fund for generals' aircraft, a possible example being the ex-Eastern Air Line C-49B used by Lt. Gen. Krueger for travelling between San Antonio, Texas, and Lake Charles, Louisiana.

The Naval Air Transport Service ordered 30 versions of the commercial DC-3 on 16th September 1940. These were designated R4D-1 and were powered by Pratt & Whitney R-1830-92 engines, but were not delivered until a later date. However, two R4D-2s were delivered during 1941 and were allocated to the Naval Air Stations at Pensacola—Buaer *No. 4708*, and Anacostia—Buaer *No. 4707* c/n 4097.

In Australia the R.A.A.F. were operating ten DC-2 aircraft, and with the outbreak of hostilities in 1939 took over the four DC-3s operated by A.N.A. These were used for a short period by No. 8 Squadron for the training of wireless operators and were given R.A.A.F. insignia—*VH-UZJ* became *A30-1*, *VH-UZK A30-2*, *VH-ABR A30-3*, and *VH-ABC A30-4*. The first two were returned to A.N.A. during 1940.

During 1941 the British Purchasing Commission in the U.S.A. bought a number of surplus DC-3s from American Airlines and T.W.A. for use by the R.A.F. in the India and Middle East theatres of war. They were dismantled and shipped as deck cargo to the Maintenance Units in the Middle East. Two DC-3s from American Airlines, *NC33653* c/n 4116 and *NC33655* c/n 4118, which had been delivered to the airline on 5th May 1941, were sold to the purchasing commission on 9th July. They were allocated the R.A.F. serial *MA925* and *MA943*, having flown 317 and 376 hours respectively. Others included *MA928* and *MA929*, whilst a batch of six were allocated *LR230* to *LR235*.

On 7th December 1941 the Japanese attacked Pearl Harbour. One of the casualties was a DC-3 *NC33606* of Hawaiian Airlines which was shot up by the attacking aircraft.

One week later most of the American Airlines DC-3 fleet were ordered to fly to a secret rendezvous—there had been a threat that the Axis Powers were moving to take over radio stations and other installations in South America.

In the Far East a K.L.M. DC-3 *PK-ALN* was destroyed by the Japanese at Medon Airport, Indonesia, on 28th December 1941.

This was just the beginning for the DC-3, for it was during the war that this famous aircraft, the "workhorse of the air", made an imperishable name for itself.

© *Arthur Pearcy, Jnr., 1966.*

*The author gratefully acknowledges the valuable assistance given by Messrs. William T. Larkins and Crosby Maynard, plus the Douglas Aircraft Company and the many airlines in the preparation of this* Profile.

Left: *Rare wartime photograph of Swedish Air Lines* SE-BAG "*Gripen*" *(Griffon) showing identification markings carried for the courier flights to Britain.* SWEDEN *was also painted in large characters under the fuselage.* (Photo: Swedish Air Lines.) Right: *Pan American's* NC28305, *c/n 4085, photographed at San José, Costa Rica, in 1941.* (Photo: P.A.A.)

### Douglas DC-3 (Pre-1942)

## SANTA MONICA PLANT PRODUCTION

The pre-1942 Santa Monica civilian production line included 19 DSTs with Wright SGR-1820-G2 engines, 19 DSTs with Pratt & Whitney SB3G engines, and a total of 417 DC-3s, making a total of 455 machines produced. The construction blocks are listed below in detail.

| *Constructors numbers* | *Type* | *Total* | *Constructors numbers* | *Type* | *Total* | *Constructors numbers* | *Type* | *Total* | *Constructors numbers* | *Type* | *Total* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1494 to 1500 | DST | 7 | 1951 to 1960 | DST | 10 | 1985 to 2000 | DC-3 | 16 | 4080 to 4148 | DC-3 | 69 |
| 1545 to 1557 | DC-3 | 13 | 1961 | DC-3 | 1 | 2002 to 2036 | DC-3 | 35 | 4174 | DC-3 | 1 |
| 1588 to 1590 | DC-3 | 3 | 1962 to 1965 | DST | 4 | 2054 to 2056 | DC-3 | 3 | 4177 | DC-3 | 1 |
| 1900 to 1921 | DC-3 | 22 | 1966 to 1970 | DST/DC-3 | 5 | 2093 to 2094 | DC-3 | 2 | 4179 to 4184 | DC-3 | 5 |
| 1922 to 1924 | DST/DC-3 | 3 | 1971 to 1975 | DC-3 | 5 | 2102 to 2111 | DC-3 | 10 | 4800 to 4816 | DC-3 | 17 |
| 1925 to 1929 | DC-3 | 5 | 1976 to 1977 | DST | 2 | 2118 to 2149 | DC-3 | 32 | | Grand total | 455 |
| 1930 to 1934 | DST/DC-3 | 5 | 1978 to 1982 | DC-3 | 5 | 2165 to 2272 | DC-3 | 108 | | | |
| 1935 to 1949 | DC-3 | 15 | 1983 to 1984 | DST | 2 | 3251 to 3299 | DC-3 | 49 | | | |

Quite a number of the latter production aircraft were allocated to airlines and given a civilian registration, but taken over by the Army Air Corps and given a military designation. This was during 1941. Production of the DST/DC-3 commenced during the latter part of 1935.

## DOUGLAS DC-3 MODEL DESIGNATIONS

### U.S. ARMY AIR CORPS MODELS

| *Model* | | *Description* |
|---|---|---|
| DC-3-253 | C-41, | one only *38-502*, c/n 2053 similar to C-39 (DC-2)—P. & W. R-1830-21 engines. |
| DC-3-253A | C-41A, | one only *40-70*, c/n 2145 commercial DC-3, plush interior for 23 passengers, P. & W. R-1830-21 engines. |
| DC-3-360 | C-47-DL, | 953 built at Long Beach plant including *41-7722/7866* c/n 4200/4374 (includes 30 Navy R4Ds in c/ns); *41-18337/18699* c/n 4375 onwards, *41-38564/38763* c/n 6000/6222 but serials not running consecutively, militarised DC-3, cargo and troop carrier, P. & W. R-1830-92 engines. |
| DC-3-377 | C-48, | one only *41-7681* c/n 3256, originally built for United Air Lines as *NC25612*, but turned over to Army Air Corps, 21 seats, P. & W. R-1830-82 engines. |
| DC-3-368 | C-48A, | three built *41-7682/4* c/n 4146/8, commercial DC-3, staff transport with P. & W. R-1830-51 engines. |
| DC-3-384 | C-49, | six built *41-7685/7689* c/n 3270/4, originally for T.W.A. with 24-passenger interior and Wright Cyclone R-1820-71 engines. |
| DC-3-385 | C-49A, | one only *41-7690* c/n 3282, originally for Delta, 21 passengers door on left, Wright Cyclone R-1820-71 engines. |
| DC-3-386 | C-49C, | two built *41-7715* c/n 4814, *41-7721* c/n 4815, originally for Delta, DC-3 trooper with side seats, Wright Cyclone R-1820-71 engines. |
| DC-3-387 | C-49B, | three built *41-7691/3* c/n 4094/6, originally for Eastern, commercial DC-3, 21 passengers, door on right side, Wright Cyclone R-1820-71 engines. |
| DC-3-389 | C-49D, | five built *41-7716/7720* c/n 4141/5, originally for Eastern, DC-3 trooper with side seats, Wright Cyclone R-1820-71 engines. |
| DC-3-390 | C-51, | one only *41-7702* c/n 3289, originally for Colonial as *NC34962*, right-hand door, Wright Cyclone R-1820-83 engines. |
| DC-3-391 | C-50C, | one only *41-7695* c/n 4083, originally for Penn-Central, commercial DC-3, 21 passengers, left-hand door, Wright Cyclone R-1820-79 engines. |
| DC-3-392 | C-50D, | four built *41-7696* c/n 4084, *41-7709* c/n 4131, *41-7712* c/n 4134, *41-7713* c/n 4135, originally for Penn-Central, left-hand door, as C-53, Wright Cyclone R-1820-79 engines. |
| DC-3-394 | C-52A. | one only *41-7714*, c/n 4813, originally for Western Air Lines as *NC19387*, DC-3 trooper, right-hand door, P. & W. R-1830-51 engines. |
| DC-3-395 | C-52B, | two built *41-7706/7* c/n 4127/8, originally for United Air Lines, as *C-52*, *C-52A*, right-hand door, P. & W. R-1830-51 engines. |
| DC-3-396 | C-50, | four built *41-7697/7700* c/n 4119/4122, originally built for American Airlines (c/n 4122, *NC33662* but never taken up) commercial DC-3, 21 passengers, right-hand door, Wright Cyclone R-1820-85 engines. |
| DC-3-397 | C-50B, | three built *41-7703/5* c/n 4109/4111, originally for Braniff, commercial DC-3, left-hand door, Wright Cyclone R-1820-81 engines. |
| DC-3-398 | C-52, | one only *41-7708* c/n 4112, originally for United Air Lines, DC-3 trooper, right-hand door, P. & W. R-1830-51 engines. |
| DC-3-401 | C-50A, | two built *41-7710/11* c/n 4804/5, originally for American Airlines but taken over on production line, c/n 4805 allocated *NC33628* but never taken up, as *C-53*, right-hand door, Wright Cyclone R-1820-85 engines. |
| DC-3-402 | C-52C, | one only *41-7701* c/n 4136, originally for Eastern, trooper with left-hand door, P. & W. R-1830-51 engines. |
| DC-3-405 | C-53, | 219 built including *41-20045/6* c/n 4816/7, *41-20051* c/n 4821, *41-20053* c/n 4823, *41-20060/20136* c/n 4830/4906. Troop transpor with P. & W. R-1830-92 engines, 28 passengers, side seats, as Navy R4D-3. |

*Note:* All but C-47-DL produced at Santa Monica plant—symbol "DO" allocated to this plant.

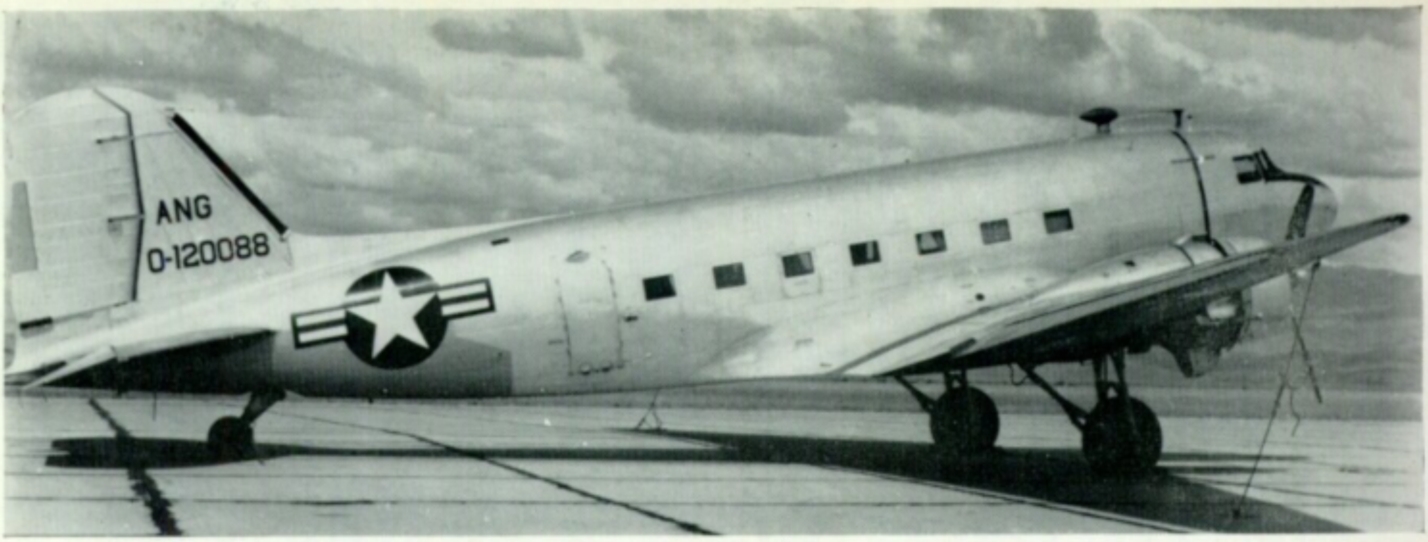
### Douglas DC-3 (Pre-1942)

## U.S. AIRLINE FLEET LIST 1939/41

**American Airlines Inc.** (Cyclone powered)

| *Reg.* | *c/n* | *Date built* | *Reg.* | *c/n* | *Date built* | *Reg.* | *c/n* | *Date built* |
|---|---|---|---|---|---|---|---|---|
| *NC15575* | 4109 | 6-41 | *NC17332* | 1918 | 2-37 | *NC21797* | 2201 | 2-40 |
| *NC15577* | 4805 | 7-41 | *NC17333* | 1919 | 2-37 | *NC21798* | 2202 | 2-40 |
| *NC15579* | 4122 | 6-41 | *NC17334* | 1920 | 2-37 | *NC21799* | 2203 | 3-40 |
| *NC15580* | 4134 | 8-41 | *NC17335* | 1921 | 3-37 | *NC25629* | 2249 | 3-40 |
| *NC15590* | 2244 | 7-40 | *NC17336* | 1961 | 6-37 | *NC25658* | 2204 | 7-40 |
| *NC15592* | 2248 | 7-40 | *NC17337* | 1962 | 6-37 | *NC25660* | 2205 | 3-40 |
| *NC16002* | 1496 | 6-36 | *NC17338* | 1963 | 7-37 | *NC25661* | 2206 | 3-40 |
| *NC16003* | 1497 | 6-36 | *NC17339* | 1964 | 7-37 | *NC25664* | 2208 | 3-40 |
| *NC16004* | 1498 | 6-36 | *NC17340* | 2140 | 5-39 | *NC25665* | 2209 | 3-40 |
| *NC16006* | 1500 | 7-36 | *NC18141* | 2137 | 5-39 | *NC25670* | 2210 | 3-40 |
| *NC16007* | 1549 | 8-36 | *NC18142* | 2138 | 5-39 | *NC25671* | 2211 | 3-40 |
| *NC16009* | 1545 | 8-36 | *NC18143* | 2139 | 5-39 | *NC25672* | 2212 | 3-40 |
| *NC16011* | 1547 | 9-36 | *NC19922* | 4135 | 8-41 | *NC25673* | 2213 | 5-40 |
| *NC16012* | 1548 | 9-36 | *NC21745* | 2103 | 2-39 | *NC25676* | 2214 | 5-40 |
| *NC16013* | 1551 | 9-36 | *NC21746* | 2104 | 2-39 | *NC25684* | 2215 | 5-40 |
| *NC16015* | 1553 | 10-36 | *NC21747* | 2105 | 2-39 | *NC25685* | 2216 | 5-40 |
| *NC16016* | 1554 | 10-36 | *NC21748* | 2106 | 2-39 | *NC28325* | 2263 | 5-40 |
| *NC16018* | 1556 | 10-36 | *NC21749* | 2107 | 2-39 | *NC28350* | 2264 | 8-40 |
| *NC16019* | 1557 | 10-36 | *NC21752* | 2165 | 8-39 | *NC33651* | 4115 | 8-40 |
| *NC16030* | 1546 | 8-36 | *NC21768* | 2167 | 8-39 | *NC33654* | 4117 | 5-41 |
| *NC16096* | 2136 | 5-39 | *NC21794* | 2199 | 2-40 | *NC33656* | 4802 | 5-41 |
| *NC17331* | 1917 | 2-37 | *NC21795* | 2200 | 2-40 | *NC21793* | 2198 | 5-41 |

*The first R4D-2*, 4707, *c/n 4097*, *based on U.S.N.A.S.* Anacostia *and photographed at San Francisco in November 1941.*
(Photo: William T. Larkins)



*Still serving the U.S.A.F. at Air National Guard H.Q. is this C-53,* 41-20088, *c/n 4858. Note door on starboard side of fuselage.*
(Photo: A.P. Library)

**Braniff Airways Inc.** (Cyclone powered)

| Reg. | c/n | Date built | Reg. | c/n | Date built | Reg. | c/n | Date built |
|---|---|---|---|---|---|---|---|---|
| NC21773 | 2179 | 12-39 | NC25668 | 2241 | 6-40 | NC28362 | 4106 | 6-41 |
| NC21775 | 2181 | 12-39 | NC25669 | 2242 | 6-40 | NC28363 | 4107 | 6-41 |
| NC21776 | 2182 | 12-39 | NC25693 | 2266 | 9-40 | NC28364 | 4108 | 6-41 |
| NC25667 | 2240 | 6-40 | | | | | | |

**Chicago & Southern Airlines Inc.** (Cyclone powered)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| NC25625 | 2218 | 4-40 | NC25627 | 2220 | 4-40 | NC25628 | 2221 | 3-40 |
| NC25626 | 2219 | 4-40 | | | | | | |

**Continental Airlines Inc.** (Twin Wasp powered)

| | | |
|---|---|---|
| NC15565 | 4849 | 12-41 |

**Delta Air Corporation** (Cyclone powered)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| NC28340 | 3277 | 11-40 | NC28342 | 3279 | 12-40 | NC28344 | 3281 | 12-40 |
| NC28341 | 3278 | 12-40 | NC28343 | 2267 | 12-40 | NC28345 | 2224 | 2-40 |

**Eastern Air Lines** (Cyclone powered)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| NC15596 | 2247 | 9-40 | NC21728 | 2144 | 8-39 | NC28382 | 4090 | 2-41 |
| NC15597 | 2257 | 9-40 | NC21729 | 2141 | 6-39 | NC28384 | 4092 | 2-41 |
| NC15598 | 2258 | 9-40 | NC21743 | 2102 | 2-39 | NC28385 | 4093 | 2-41 |
| NC15599 | 2259 | 9-40 | NC21744 | 2108 | 6-40 | NC28391 | 2263 | 10-40 |
| NC18120 | 1996 | 10-37 | NC25646 | 2234 | 6-40 | NC28392 | 2269 | 10-40 |
| NC18121 | 1997 | 10-37 | NC25647 | 2235 | 6-40 | NC33631 | 4137 | 9-41 |
| NC18124 | 2000 | 12-37 | NC25648 | 2236 | 6-40 | NC33632 | 4138 | 9-41 |
| NC19963 | 2260 | 9-40 | NC25650 | 2225 | 2-40 | NC33633 | 4139 | 9-41 |
| NC19968 | 3252 | 10-40 | NC25651 | 2226 | 2-40 | NC33634 | 4140 | 9-41 |
| NC19969 | 3253 | 10-40 | NC28381 | 4089 | 1-41 | NC33643 | 4129 | 6-41 |
| NC19970 | 3254 | 10-40 | | | | | | |

**Northeast Airlines Inc.** (Cyclone powered)

| | | | | | |
|---|---|---|---|---|---|
| NC28323 | 2253 | 7-40 | NC28324 | 2254 | 8-40 |

**Northwest Airlines Inc.** (Twin Wasp powered)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| NC21711 | 2123 | 4-39 | NC21777 | 2146 | 8-39 | NC33324 | 1954 | 7-37 |
| NC21713 | 2125 | 4-39 | NC25608 | 2183 | 1-40 | NC33326 | 4127 | 7-41 |
| NC21715 | 2130 | 6-39 | NC25609 | 2184 | 1-40 | NC33327 | 4128 | 7-41 |
| NC21716 | 2131 | 6-39 | NC25610 | 2185 | 1-40 | | | |

**Pennsylvania-Central Airlines Inc.** (Cyclone powered)

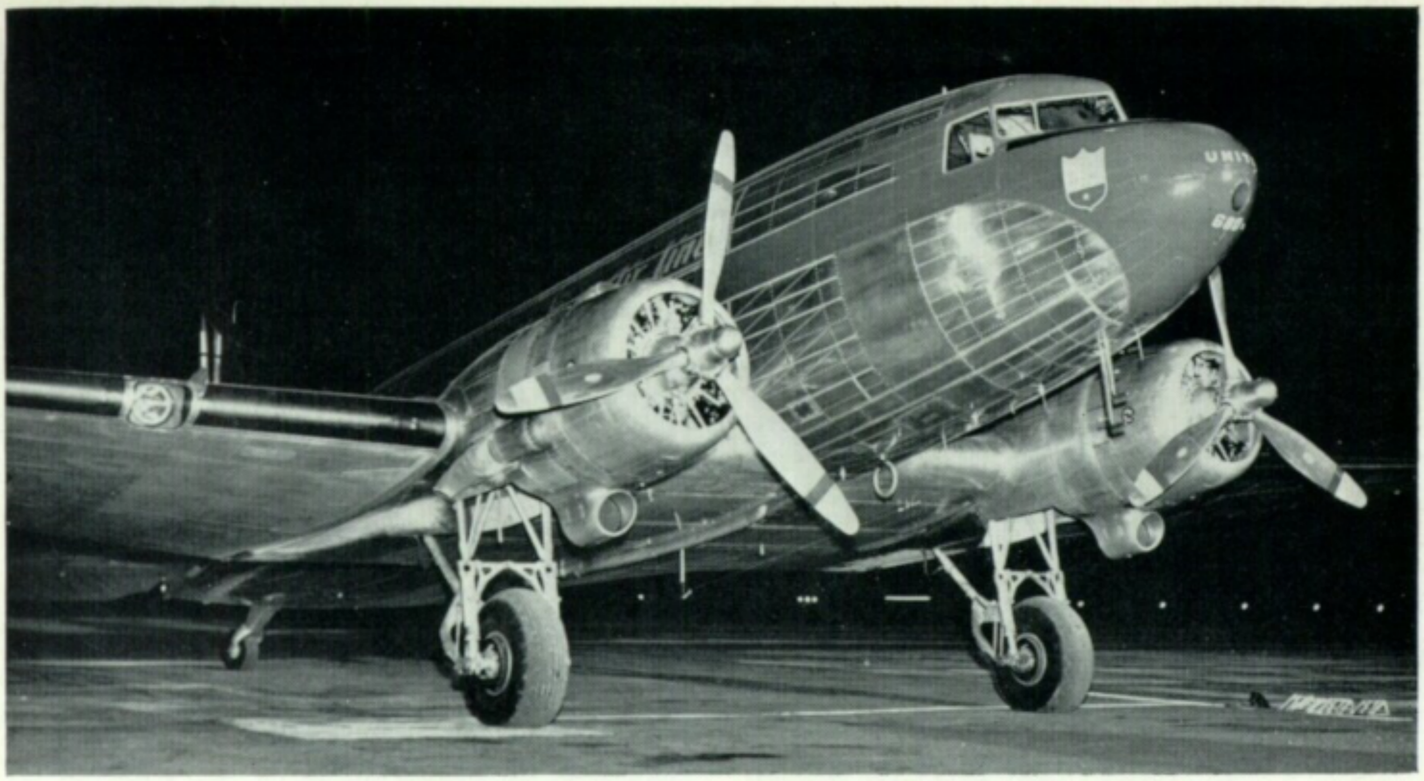
| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| NC21781 | 2169 | 11-39 | NC21786 | 4131 | 7-41 | NC25689 | 4099 | 4-41 |
| NC21782 | 2170 | 11-39 | NC21787 | 2186 | 5-40 | NC25691 | 2256 | 9-40 |
| NC21783 | 2171 | 11-39 | NC33677 | 4132 | 3-41 | NC25696 | 4082 | 3-41 |
| NC21784 | 2172 | 12-39 | NC21788 | 4110 | 6-41 | NC25695 | 4081 | 3-41 |
| NC21785 | 2173 | 12-39 | NC21790 | 2189 | 5-40 | NC33678 | 4133 | 7-41 |

**Transcontinental & Western Air Inc.** (Cyclone powered)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| NC1941 | 3266 | 12-40 | NC15589 | 2243 | 6-40 | NC18949 | 2013 | 12-37 |
| NC1942 | 3267 | 12-40 | NC15591 | 2245 | 7-40 | NC18950 | 2014 | 12-37 |
| NC1943 | 3268 | 12-40 | NC16095 | 1916 | 12-36 | NC18952 | 2016 | 12-37 |
| NC1944 | 3269 | 1-41 | NC17312 | 1922 | 2-37 | NC18953 | 2027 | 1-38 |
| NC1945 | 3294 | 2-41 | NC17314 | 1924 | 5-37 | NC18954 | 2028 | 1-38 |
| NC1947 | 3296 | 2-41 | NC17318 | 1933 | 6-37 | NC19974 | 2250 | 7-40 |
| NC1948 | 3298 | 3-41 | NC17320 | 1966 | 8-37 | NC28321 | 2252 | 7-40 |
| NC1949 | 3299 | 3-41 | NC17321 | 1967 | 8-37 | NC28393 | 3251 | 10-40 |
| NC14931 | 2118 | 3-39 | NC17323 | 1969 | 8-37 | NC33623 | 3288 | 6-41 |
| NC14932 | 2119 | 3-39 | NC17324 | 1970 | 8-37 | NC38943 | 3280 | 12-40 |
| NC14933 | 2120 | 4-39 | | | | | | |

**United Air Lines Inc.** (Twin Wasp powered)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| NC18938 | 2004 | 2-38 | NC25617 | 3261 | 11-40 | NC16063 | 1903 | 12-36 |
| NC18939 | 2005 | 3-38 | NC25618 | 3262 | 11-40 | NC16065 | 1905 | 1-37 |
| NC18940 | 2006 | 3-38 | NC25620 | 3264 | 11-40 | NC16067 | 1907 | 1-37 |
| NC18941 | 2007 | 4-38 | NC25621 | 2227 | 5-40 | NC16068 | 1908 | 1-37 |
| NC18942 | 2008 | 4-38 | NC25622 | 2270 | 9-40 | NC16069 | 1909 | 1-37 |
| NC18943 | 2010 | 4-38 | NC25675 | 2147 | 10-39 | NC16070 | 1910 | 11-36 |
| NC18944 | 2017 | 4-38 | NC25677 | 2174 | 1-40 | NC16071 | 1911 | 11-36 |
| NC18945 | 2018 | 4-38 | NC25679 | 2176 | 1-40 | NC16087 | 1926 | 1-37 |
| NC19948 | 3287 | 5-41 | NC25680 | 2177 | 2-40 | NC16088 | 1927 | 2-37 |
| NC19964 | 2265 | 8-40 | NC25681 | 2221 | 4-40 | NC16089 | 1928 | 3-37 |
| NC25611 | 3255 | 11-40 | NC28379 | 3283 | 3-41 | NC18103 | 1951 | 7-37 DST |
| NC25613 | 3257 | 11-40 | NC33641 | 4113 | 4-41 | NC18105 | 1953 | 7-37 |
| NC25614 | 3258 | 11-40 | NC15586 | 4112 | 7-41 | NC18111 | 1983 | 8-37 |



*Fine study of a United Air Lines DC-3A (*NC25680, *c/n 2177) at night; Pratt & Whitney Twin Wasp powerplants.*
(Photo: William T. Larkins)

**United Air Lines Inc.** (Twin Wasp powered)—*continued*

| *Reg.* | *c/n* | *Date built* | *Reg.* | *c/n* | *Date built* | *Reg.* | *c/n* | *Date built* |
|---|---|---|---|---|---|---|---|---|
| *NC25615* | 3259 | 11-40 | *NC16061* | 1901 | 12-36 | *NC18112* | 1984 | 9-37 |
| *NC25616* | 3260 | 11-40 | *NC16062* | 1902 | 12-36 | *NC18145* | 1977 | 3-38 DST |

**Western Air Lines Inc.** (Twin Wasp powered)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| *NC18101* | 1959 | 6-37 | *NC33621* | 3286 | 4-41 | *NC33647* | 4126 | 4-41 |
| *NC19387* | 4813 | 8-41 | *NC33644* | 4123 | 4-41 | | | |

**Pan American Airways Inc.** (Twin Wasp powered)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| *NC17316* | 1931 | 6-37 | *NC28301* | 3290 | 1-41 | *NC33609* | 4100 | 5-41 |
| *NC25642* | 2229 | 5-40 | *NC28302* | 3291 | 1-41 | *NC33610* | 4101 | 5-41 |
| *NC25645* | 2232 | 6-40 | *NC28304* | 3293 | 1-41 | *NC33611* | 4102 | 5-41 |
| *NC25653* | 2193 | 4-40 | *NC28305* | 4085 | 1-41 | *NC33612* | 4103 | 5-41 |
| *NC25654* | 2194 | 4-40 | *NC28306* | 4086 | 1-41 | *NC33613* | 4104 | 5-41 |
| *NC25655* | 2195 | 4-40 | *NC28307* | 4807 | 1-41 | *NC33614* | 4105 | 5-41 |
| *NC25657* | 2197 | 5-40 | *NC28308* | 4088 | 1-41 | | | |

**Pan American Grace Airways Inc.** (Cyclone powered)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| *NC18118* | 1994 | 10-37 | *NC18119* | 1995 | 10-37 | *NC18936* | 2011 | 10-37 |

**Pan American Grace Airways Inc.** (Twin Wasp powered)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| *NC14967* | 2190 | 4-40 | *NC25652* | 2192 | 4-40 | *NC28380* | 3284 | 3-41 |
| *NC14996* | 2191 | 4-40 | *NC28334* | 4800 | 8-41 | *NC30008* | 4177 | 12-41 |
| *NC21718* | 2134 | 6-39 | *NC28335* | 4801 | 8-41 | *NC30014* | 4183 | 12-41 |

**Canadian Colonial Airways.** (Cyclone powered)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| *NC21751* | 2127 | 4-39 | *NC21759* | 2238 | 6-40 | *NC28360* | 2271 | 11-40 |
| *NC21758* | 2237 | 6-40 | | | | | | |

**Hawaiian Airlines.** (Twin Wasp powered)

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| *NC33606* | 4806 | 8-41 | *NC33607* | 4807 | 8-41 | *NC33608* | 4808 | 8-41 |

The fleet list is by no means complete as it only covers 267 aircraft out of the pre-1942 production of 455 machines. As stated it only covers some of the U.S. airlines. However, it is a great indication of the impact the DC-3 had on air travel pre-1942.

## DOUGLAS DST/DC-3 SPECIFICATION

| Model | DST | DST | DC-3 (Pass.) | DC-3 (Cargo) | DC-3 (Pass.) | DC-3 (Cargo) |
|---|---|---|---|---|---|---|
| Engines—Manufacturer/Model .. | Wright SGR-1820-G2 | Pratt & Whitney SB3G | Wright R-1820 | Wright R-1820 | Pratt & Whitney R-1830 | Pratt & Whitney R-1830 |
| Take-off h.p. per engine .. .. .. | 1,000 | 1,000 | 1,200 | 1,200 | 1,200 | 1,200 |
| Normal cruise speed (knots) .. .. | 167 | 167 | 167 | 167 | 167 | 167 |
| Operating altitude (feet) .. .. | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 |
| Range at maximum fuel (nautical miles) | 1,200 | 1,200 | 1,300 | 1,300 | 1,300 | 1,300 |
| Maximum payload (pounds) .. .. | 3,134 | 3,134 | 5,380 | 9,000 | 7,380 | 9,000 |
| Maximum gross weight (pounds) .. | 25,000 | 25,200 | 25,200* | 26,900 | 25,200 | 26,900 |
| Maximum seating—First class .. .. | 14 (Sleeper) | 14 (Sleeper) | 14 | — | 14 | — |
| ,, ,, Tourist .. .. | 14 (Sleeper) | 14 (Sleeper) | 32 | — | 32 | — |
| Cargo capacity (cubic feet) .. .. | 293 | 293 | 250 | 1,245 | 250 | 1,245 |
| Type certificate No. .. .. .. | 607 | 647 | 618 | 618 | 619 | 619 |
| Date issued .. .. .. .. | 21/5/36 | 30/6/37 | 20/9/37 | — | 28/11/36 | — |
| Wing span .. .. .. .. | 9f ft. 0 in. | 95 ft. 0 in. | 95 ft. 0 in. | 95 ft. 0 in. | 95ft. 0 in. | 95 ft. 0 in. |
| Length .. .. .. .. | 64 ft. 6 in. | 64 ft. 6 in. | 64 ft. 6 in. | 64 ft. 6 in. | 64 ft. 6 in. | 64 ft. 6 in. |
| Height .. .. .. .. | 16 ft. 11 in. | 16 ft. 11 in. | 16 ft. 11 in. | 16 ft. 11 in. | 16 ft. 11 in. | 16 ft. 11 in. |
| Wing area .. .. .. .. | 987 sq. ft. | 987 sq. ft. | 987 sq. ft. | 987 sq. ft. | 987 sq. ft. | 987 sq. ft. |
| Initial airline user .. .. .. | American A/L | United A/L | American A/L | — | United A/L | — |
| Delivery date to airline .. .. .. | 7/6/36 | 30/6/37 | 8/8/36 | — | 25/11/36 | — |

* *Military version:* Max. gross weight 33,000 lb.; Max. payload 9,028 lb.

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